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Audio Multichannel Monitor

AMM768 Data Sheet

AMM768

Features & Benefits

- Easy Monitoring of Audio Signals with Bars, Phase, and Surround*1 Displays
- Advanced Status and Session Displays Provide Detailed Insight of the Digital Content
- HD/SD Picture Display with Closed Caption (Option SDI) Allows You to Verify Correct Association of Audio to Video Content
- Modular Configurations to Support the Monitoring of Analog and Digital Signals (Embedded or de-embedded) Including AES/EBU, Dolby Digital, and Dolby E, All in One Platform
- FlexVu™ 4-tile XGA Display for Easy Operation
- Front-panel Headphone Port for Quick Verification of Audio
- Web-user Interface for Remote Operation and Monitoring
- Status Display for Quick Identification of Signal Information and Report of Alarms
- Capacity for 20 Custom Presets that can be Downloaded and Uploaded through a USB Port for Faster Equipment Setup
- Online Help System with Instrument Navigation Guide and Information for Menu Items
- Comprehensive Alarm Reports with Storage Capacity to Log up to 10,000 Events
- Two Sets of Eight AES/EBU Digital Channels
- Two Sets of Six Analog Channels (Option AD or higher)
- Two Sets of Ten Audio Bars for Decoded Dolby Digital and Dolby E (Options DD and DDE with SDI)

Applications

- Quick Visual Inspection of Audio and Video in Master Control and Transmission Room
- Setup, Calibration, and Maintenance of Audio Equipment
- Troubleshooting of Audio Problems in Broadcast and Production
- Quality Verification in the Ingestion Process

*1 Audio Surround Sound Display licensed from Radio-Technische Werkstätten GmbH & Co. KG (RTW) of Cologne, Germany.

Tektronix' AMM768 is the advanced audio multichannel monitoring platform designed for the video industry. In the engineering environment, the AMM768 is a valuable setup and calibration tool to facilitate the control and maintenance of the audio equipment. In production, broadcast, and distribution this instrument is capable of monitoring analog, digital AES/EBU, Dolby Digital, and Dolby E audio signals at each point of the production and distribution system.

The AMM768 is a powerful tool in environments that require simultaneous monitoring of audio and SDI video in real time. In these environments, quick visual inspection of both audio and video is a necessity. The AMM768 provides detailed audio information to help technicians, operators, and engineers address daily challenges. When problems occur, the AMM768 helps users troubleshoot failures such as audio signals not being embedded into video, detection of missing channels, or defects in the audio signal.

The AMM768 features Bar, Lissajous, and Surround audio displays. For alarm and status tracking, the AMM768 features comprehensive Session and Status display functions.

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Flexibility

The modular architecture of the AMM768 provides, in a single platform, scalable solutions to meet diverse applications and evolve with your needs. This instrument supports a variety of audio options from digital audio AES/EBU, analog audio, and compressed formats Dolby Digital and Dolby E. The AMM768 can be upgraded in the field to enable additional monitoring options.

Ease of Use

Exclusive features such as FlexVu™ 4-tile display, multiple presets, and the SDI option with picture display, simplify operations and boost productivity.

The AMM768 provides an auxiliary XGA output for an external display. Full Ethernet connectivity and SNMP interface provide advanced report management and remote operation.

Technical Excellence

To perform unattended monitoring of content and to prepare maintenance records, the AMM768 provides the most comprehensive report of audio status and statistics.

Tektronix' exclusive SDI option enables audio de-embedding and picture display with closed caption. This option provides an additional level of insight in the signal, and allows for a smooth monitoring of audio signals in video/audio environments.

Flexible Configurations – Support Technology Evolution

AMM768 can be configured and upgraded flexibly to support, in one platform, the monitoring of multiple types of analog and digital audio. Monitoring options can be added to a previously purchased instrument with a field-installable upgrade.

The AMM768 provides a modular approach that allows users to meet their current needs and be prepared for future transitions. This capability proves particularly useful to accurately and efficiently verify the quality of legacy audio and emerging multichannel audio technology in today's transitioning environments.

Monitoring audio in a video application.

Flexibility in decoding to output channels in digital and analog:

- **Option DS** monitors de-embedded digital audio and AES/EBU formats
- **Option AD** monitors analog audio formats and digital de-embedded audio in AES/EBU formats
- **Option DD** monitors and decodes Dolby Digital audio (AC-3) plus monitors analog and digital de-embedded audio and AES/EBU formats
- **Option DDE** monitors and decodes Dolby E and Dolby Digital audio plus monitors analog and digital de-embedded audio and AES/EBU formats
- **Option SDI** provides audio de-embedding and AMM768 picture display

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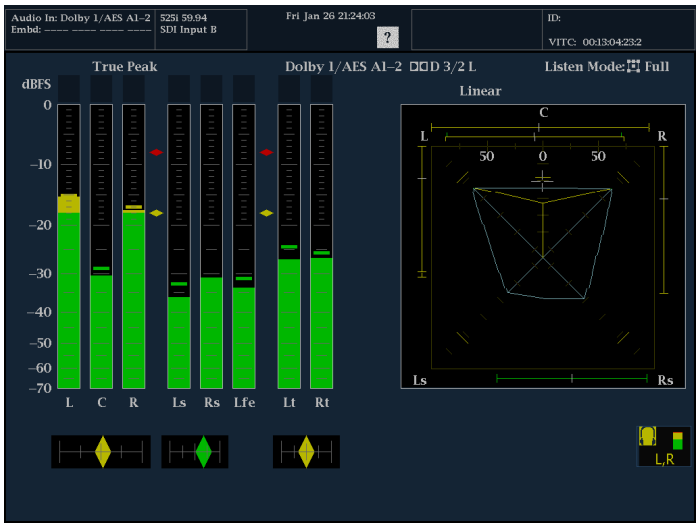
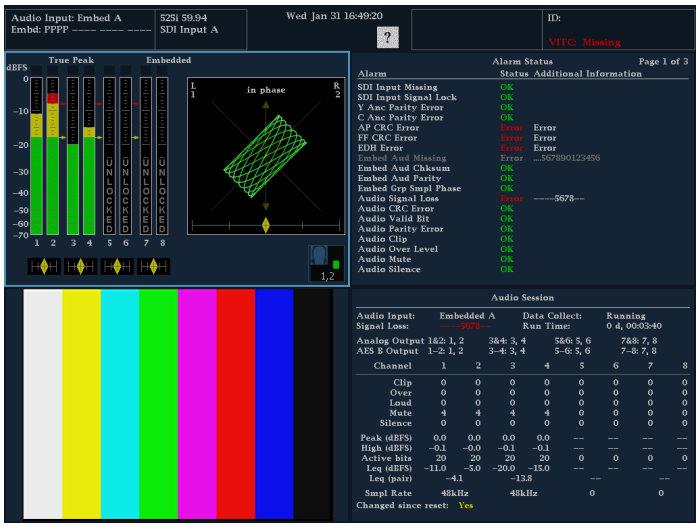


Surround Sound Display*1 monitoring a Dolby signal.


Audio Input: Embed A
Embd: PPPP ----- ----- -----
525i 59.94
SDI Input A
Wed Jan 31 16:49:20
ID:
VITC: Missing
True Peak
Embedded
dBFS
UNLOCKED
in phase
1,2
Alarm Status
Page 1 of 3
Alarm Status Additional Information
SDI Input Missing OK
SDI Input Signal Lock OK
Y Anc Parity Error OK
C Anc Parity Error OK
AP CRC Error Error Error
FF CRC Error Error Error
EDH Error Error Error
Embed Aud Missing Error ...567890123456
Embed Aud Chksum OK
Embed Aud Parity OK
Embed Grp Smpl Phase OK
Audio Signal Loss Error -----5678---
Audio CRC Error OK
Audio Valid Bit OK
Audio Parity Error OK
Audio Clip OK
Audio Over Level OK
Audio Mute OK
Audio Silence OK
Audio Session
Audio Input: Embedded A
Signal Loss: -----5678---
Data Collect: Running
Run Time: 0 d, 00:03:40
Analog Output 1&2: 1, 2 3&4: 3, 4 5&6: 5, 6 7&8: 7, 8
AES B Output 1–2: 1, 2 3–4: 3, 4 5–6: 5, 6 7–8: 7, 8
Channel 1 2 3 4 5 6 7 8
Clip 0 0 0 0 0 0 0 0
Over 0 0 0 0 0 0 0 0
Loud 0 0 0 0 0 0 0 0
Mute 4 4 4 4 0 0 0 0
Silence 0 0 0 0 0 0 0 0
Peak (dBFS) 0.0 0.0 0.0 0.0 --- --- --- ---
High (dBFS) –0.1 –0.0 –0.1 –0.1 --- --- --- ---
Active bits 20 20 20 20 0 0 0 0
Leq (dBFS) –11.0 –5.0 –20.0 –15.0 --- --- --- ---
Leq (pair) –4.1 –13.8 --- ---
Smpl Rate 48kHz 48kHz 0 0
Changed since reset: Yes

FlexVu™ Display provides status at a glance.

Dolby Monitoring - Advanced Audio Support Today

New technological trends like the transmission of Dolby audio enhance the entertainment experience. Advanced formats like Dolby are increasingly popular in audio applications.

Dolby audio can be carried embedded on an SDI signal or as discrete digital audio. The AMM768 provide simple in-bar display of the type of Dolby signal present on the input, allowing the user to quickly interpret the signal and configure the instrument appropriately.

The AMM768 offers monitoring capability for the audio types most frequently used in the video/audio broadcasting environments including Dolby Digital and Dolby E.

Option DD allows for monitoring of Dolby Digital, and Option DDE allows for monitoring of up to ten Dolby E channels. Dolby status displays offer in-depth review of decoded Dolby metadata.

All audio options have an audio bar display and can display up to six audio bars for analog inputs, up to eight audio bars on AES and embedded audio sources, and up to ten audio bars when decoding Dolby Digital or Dolby E.

AMM768 has the ability to decode Dolby E to a variety of different outputs analog or digital. Eight analog and digital outputs are available by reconfiguring Input B.

*1 Audio Surround Sound Display licensed from Radio-Technische Werkstätten GmbH & Co. KG (RTW) of Cologne, Germany.

Ease of Use – Tools to Optimize Your Operations

The AMM768 provides unique user-interface features to improve efficiency in production operations and engineering.

The integrated FlexVu™ Display interface of AMM768 allows for the simultaneous display of four display tiles to monitor, at a glance, several aspects of the signal.

You can create and store up to 20 presets and organize them into five groups. Using presets, you can configure the instrument for specific tasks or personal preferences. You can label the presets and preset groups for easy identification. The presets can be downloaded to a USB memory device and then transferred to another AMM768 unit.

A convenient front-panel headphone connector lets you listen to any stereo audio output to quickly verify the quality of the audio signal.

The advanced online help system has two levels of information:

- Help for each button and menu item
- Instrument-level help with tutorial-type information

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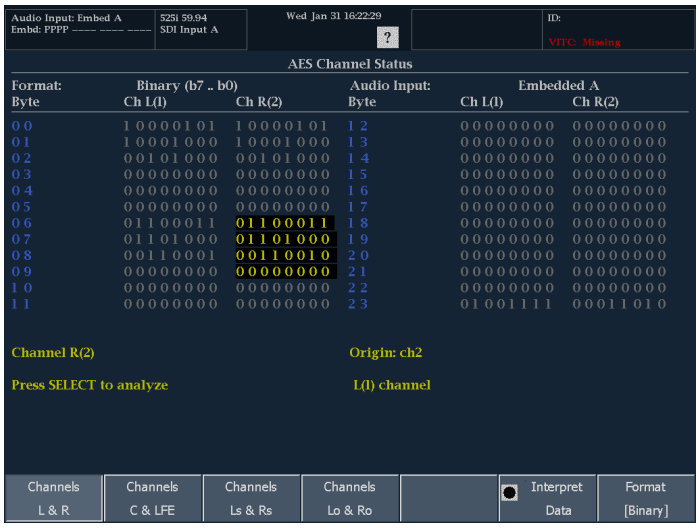

Binary Channel status showing digital audio data.

No Signal
SDI Input B
Ref: Internal
Wed Jan 03 17:08:52
ID:
Audio In: Dolby 1/AES A1–2
VITC: Missing
Audio Session
Audio Input: Dolby 1
Signal Loss:
Data Collect: Stopped
Run Time: 0 d, 01:13:19
Analog Output 1&2: L, R 3&4: none 5&6: none 7&8: none
AES B Output 1–2: L, R 3–4: none 5–6: none 7–8: none
Channel L R (3) (4) (5) (6) (7) (8) Lt Rt
Clip 0 0 0 0 0 0 0 0 0 0
Over 0 0 0 0 0 0 0 0 0 0
Loud 0 0 0 0 0 0 0 0 0 0
Mute 31 89 22 2025 40 25 0 0 33 45
Silence 22 22 17 18 0 0 0 0 21 21
Peak (dBFS) –12.1 –13.1 –17.2 –16.3 –14.4 –15.1 — — –21.7 –21.5
High (dBFS) –12.1 –13.1 –17.2 –16.3 –14.5 –15.1 — — –21.7 –21.6
Active bits 0 0 0 0 0 0 0 0 0 0
Leq (dBFS) –56.0 –68.0 –30.7 –45.4 –43.2 –38.2 — — –66.2 –78.3
Leq (pair) –55.5 — — — –65.7
Dolby Program Loudness: –49.88 dBFS
Average: — dBFS
Changed since reset: Yes
Loud Avg:short
Loud Avg:long
Run
Stop
Reset

Audio Session Display - Summary of conditions per channel.

Powerful Monitoring and Alarm Reporting Capabilities

All audio options of the AMM768 provide user-selectable scales, meter ballistics, audio-level indicators, threshold levels, and measurement durations. AMM768 features Bars, Phase, and Surround*1 audio displays.

The audio bar display provides **In-bar** messages to show status and fault conditions for each monitored audio channel, reducing the likelihood of an undetected audio problem.

The flexible audio phase display includes a phase correlation meter, and a Lissajous display that allows the selection of any two channels.

The multiple-channel **Surround Sound** display shows audio levels, total sound volume, phantom source locations, and dominant sound position that facilitates full signal monitoring at a glance.

The Audio Session display shows digital error conditions, highest true peak, and the number of clips, mutes, over-levels, silences, and loudness levels. User-specified threshold values determine over-level and silence conditions and the duration of an audio fault required to trigger an alarm.

The AES Channel Status display provides Text, Hex, or Binary display of the audio data. The Binary mode provides data decoding of the individual bits and bytes for easy interpretation and detailed analysis of the audio data.

The Alarm Status display shows a comprehensive color-coded report of audio conditions, format alarms, digital, and frame synchronization errors.

AMM768 provides several alarm notification methods, including on-screen error icons, audible beep, ground-closure output, and SNMP traps. The user can select how each alarm will be reported and which alarms must be saved in the error log.

AMM768 can store up to 10,000 events. These events are stored with time code, date, and time of day. The log file can be easily printed directly or exported to a .htm or .txt file for easy processing in Excel or database software.

This error log is provided as a standard feature with any audio option. This capacity is a must to perform unattended monitoring of content or for the preparation of maintenance and quality records.

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SDI Picture Display – Simplify the Integration of Audio and Video Content

Tektronix Option SDI provides a unique HD/SD picture display with closed caption capability. This picture display facilitates a coordinated monitoring of embedded audio signals with the corresponding video. This feature provides an additional level of insight in the content, it facilitates the identification of monitored material, simplifies the detection of embedding problems, and helps operators to unveil audio-video coordination faults.

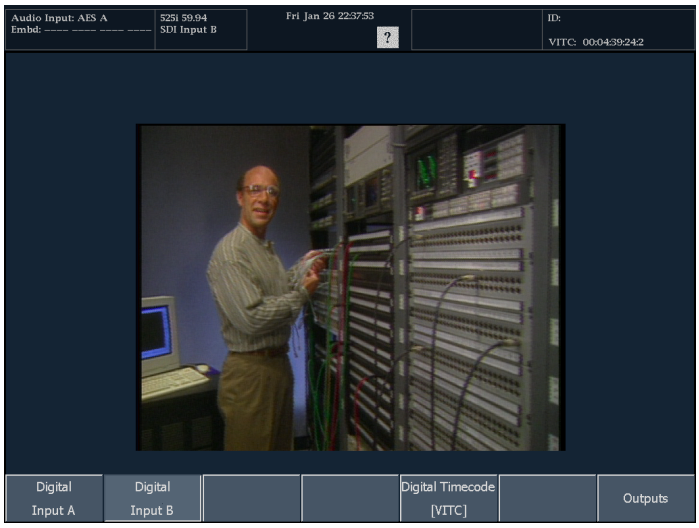
The video to audio map feature allows users to associate different audio to SDI video inputs for quick combination of audio and video signals.

This option also provides audio de-embedding for eight AES/EBU channels.

Advanced Network Connectivity

AMM768 provides full Ethernet connectivity for remote reporting and instrument operation through the Web. Its interface is compatible with SNMP. This allows for automatic report generation to a centralized location.

This instrument also provides an auxiliary XGA output for external display units, and a PIX output for full display of the SDI signal.



Picture display for easy audio/video coordination.

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AMM768 rear view.

AMM768 front view.

Characteristics

Audio Characteristics

Level Meter Resolution – 0.056 dB steps at 30 dB scale, from full scale to -20 dBFS.

User-selectable Scales –
Analog: dBu, Din, Nordic, VU, IEEE PPM, and user definable.
Digital: dBFS, DIN 45406, Nordic N9, IEEE PPM, BBC, and user definable.

Meter Ballistics – Selectable from True Peak, PPM Type 1, PPM Type 2, and Extended VU, Loudness F, and Loudness S.

Loudness F and Loudness S Definition – Loudness Equivalent (Leq) as per IEC 61672-1. For the F fast setting the time constant is 125 ms and for the S slow setting, the time constant is 1 s.

Defined/Programmable Level Detection – Mute, clip, user-programmable silence, over.

Level Meter Accuracy Over Frequency – +0.1 dB from 20 Hz to 20 kHz 0 to -40 dBFS sinewave, Peak Ballistic mode (except for within 5 Hz of some submultiples of the sampling frequency).

Inputs and Outputs

- 2 Embedded Audio Inputs (SMPTE 259M (SD) or 292/BTA-5004A (HD) compatible)
- Any analog, AES, or Dolby inputs can be mapped to headphones, AES, or analog outputs
- Connections are internally terminated, the instrument provides loopthrough
- Two sets of Digital Audio Inputs (Banks A and B) allowing for up to eight audio channels (four AES/EBU inputs)
- Bank B can be configured as an input or output. For de-embedding SDI audio or decoding of Dolby D/E
- Analog audio support two sets of analog input (Banks A and B) with six channel inputs. The analog audio output supports up to eight analog outputs
- Two SDI inputs with SDI switched output supporting HD and SD de-embedding of eight channels of any of the available 16 channels of embedded audio

Display Types

- Bars
- Bars with Lissajous
- Bars with Surround
- Alarm Status
- Dolby Status
- AES Channel Status with:
  - Text, Hex, Binary, and XMSN Binary formats
  - Binary display provides data list with cursor-selectable decoder
- Audio Session
- Video Session
- Error Log Display
- Picture with closed caption (Option SDI)

Digital Audio

AES Inputs – Two sets with eight channels each, 32-192 kHz, 24 bit. Meets requirements of AES 3-ID and SMPTE 276M-1995.

AES Input – BNC, 75 Ω terminated, unbalanced, 0.2 V to 2 V_{p-p}.

AES Input Return Loss – 25 dB relative to 75 Ω from 0.1 to 6 MHz Typ better than 30 dB to 24 MHz.

AES Outputs – Up to eight channels, AES3-ID output, 48 kHz, 20 bit for embedded, 48 kHz 24 bit for analog to AES.
For AES to AES loopthrough, output format equals input format.
Meets requirements of SMPTE 276M-1995 (AES 3-ID).
For decoded Dolby Digital, output is 24 bits at a rate of 32, 44.1, or 48 kHz for any one decoded pair.
For decoded Dolby E the output is 24 bits at 48 kHz or 47.952 kHz for up to 4 pairs.

AES Output – BNC, 75 Ω terminated, unbalanced, 0.9 V to 1.1 V_{p-p} into 75 Ω.

AES Output Return Loss – >25 dB relative to 75 Ω from 0.1 to 6 MHz.

AES Output Jitter – 3.5 ns, peak, typical, with 700 Hz high-pass filter per AES specification.

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User Interface

XGA LCD monitor with 1024 (H) × 768 (V) pixels with FlexVu, touchscreen, and backlit buttons.

Power

100 to 240 VAC ±10%, 50/60 Hz.

Physical Characteristics

Dimension	mm	in.
Height	133.4	5.25
Width	215.9	8.5
Depth (front to back including handles and BNCs)	460.4	18.125
Weight	**kg**	**lb.**
Net	5.5	12

Analog Audio (Options DDE, DD, and AD)

Analog Inputs – Two sets of six channels each.

Analog Input – Balanced, unterminated through rear-panel connector.

Cross Talk – <90 dB.

Input Impedance – 24 kΩ, typical.

Analog Outputs – Eight channels.

Analog Output – Balanced, unterminated through rear-panel connector.

Maximum Output Level – Balanced: +24 dBu ±0.5 dB.

Digital Input to Analog Output Gain Accuracy over Frequency – ±0.5 dB, 20 Hz to 20 kHz, 0 to -40 dBFS, 20 or 24 bit inputs.

Analog Input to Analog Output Gain Accuracy over Frequency – +0.8 dB, 20 Hz to 20 kHz, 24 dBu to -16 dBu.

Output Impedance – 50 Ω, nominal.

Ordering Information

AMM768

Audio Multichannel Monitor base unit.

Options

(must order one audio option)

Opt. DS – Monitoring of digital (non-embedded) AES/EBU audio (two sets of eight channels input, up to eight channels output)

Opt. AD – Capabilities of Option DS plus analog audio monitoring (up to two sets of six channels analog audio input, up to eight analog audio channels output).

Opt. DD – Capabilities of Option AD plus support for monitoring Dolby Digital (AC-3).

Opt. DDE – Capabilities of Option DD plus support for monitoring Dolby E.

Opt. SDI – Adds de-embedding capabilities, HD/SD picture, closed caption, and video session displays. It requires any of the audio monitoring options.

Upgrade Kits

AMM7UP

Upgrade Kit	Option
AMM768	Upgrade by ordering AMM7UP with the appropriate options:
	AD
	DD
	DDE
	SDI

Power Supply and Cables

A0 – North America.
A1 – Universal EURO.
A2 – United Kingdom.
A3 – Australia.
A4 – 240 V North America.
A5 – Switzerland.
A6 – Japan.
A10 – China.
A99 – No power cord or AC adapter.

Mounting Case and Hardware

NRC – No portable or rack cabinet.
01 – Portable Cabinet.
02 – Dual Rack Cabinet (same as WFM7F05 Option NN).
05 – Dual Rack Cabinet (same as WFM7F05 Option ON).
06 – Filler panel for Dual Rack Cabinet.
07 – Drawer for Dual Rack Cabinet.
62 – Analog audio breakout cable.

Service Options

C3 – Calibration Service 3 Years.
C5 – Calibration Service 5 Years.
D1 – Calibration Data Report.
D3 – Calibration Data Report 3 Years (with Opt. C3).
D5 – Calibration Data Report 5 Years (with Opt. C5).
R3 – Repair Service 3 Years (including warranty).
R5 – Repair Service 5 Years (including warranty).
CA1 – Provides a single calibration event.
IF – Upgrade installation service.

Documentation

L0 – English Manual.
L5 – Japanese Manual.
L7 – Simple Chinese Manual.

CE

ISO 9001 Product(s) are manufactured in ISO registered facilities.

GPIB IEEE-488 Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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